Further CMP results for the SCRL resource

Johnston, S.J. and Butterworth, D.S.

ABSTRACT

Results are reported for three further CMPs for the south coast rock lobster. Simulations now take the 2017 catches and CPUE values into account.

This document reports results for further CMPs for the south coast rock lobster, as requested by the SCRL SWG. The simulations now take into account the actual catches taken in each area for the 2017 season as well as the actual CPUE values for the 2017 season as recently calculated by Glazer (2019a,b).

Results are presented for three CMPs (see the Appendix for technical details of the CMPs):

- 30% recovery with the possibility of TAC decreases in the first two years.
- 22% recovery with no decrease in the TAC for the next two years.
- 30% recovery with no decrease in the TAC for the next two years.

Discussion

Table 1 provides results for three different CMP-2019 variants. Figures 1a-d show corresponding TAC trajectories, whilst Figures 2a-c show the Bsp/K trajectories. Figures 3a-b show the Bexp/K trajectories for each area.

Note that a 20% recovery is not possible (given the upper-bound TAC constraints) – the lowest recovery obtainable is 22%.

A possible concern is that the OMP gives 98.8% weighting to area 2+3 CPUE in the TAC calculation.

Note that though A1W is indicated to currently be heavily depleted (at the 5% level – see Table 1), in median terms it is indicated to increase for the next 5 years – see Fig 3.

Reference

Glazer, J.P. 2019a. The separation of catch by area in the South Coast rock lobster fishery. FISHERIES/2019/JUL/SWG-SCRL/?

Glazer, J.P. 2019b. South Coast rock lobster standardised CPUE indices per Area. FISHERIES/2019/JUL/SWG-SCRL/?

Table 1: **CMP-2019** results presented for different tunings (values of $CPUE_{targ}$). Values reported are medians, with the 5th and 95th percentiles shown in parentheses for some statistics.

$\mathbf{CPUE}_{tar}$	Allow TAC decrease in first 2 years	$\mathbf{CPUE}_{targ}$ in industry units(tails kg per day)	CPUE threshold (tails kg per day)	Bsp(2025/06)	Bsp(2025/K)	TAC 2019	Cave (2019-2025)	A1E B^{exp}(2025)/K Lower 5th%ile	A1W B^{exp}(2025)/K Lower 5th%ile	A2+3 B^{exp}(2025)/K Lower 5th%ile
1.22	YES	316	180	**1.30** (0.78; 2.32)	0.38 (0.22; 0.67)	305	355 (355; 355)	0.16	0.06	0.28
0.85	NO	220	180	**1.22** (0.67; 2.23)	0.35 (0.19; 0.65)	337	392 (392; 392)	0.14	0.05	0.25
1.22	NO	316	180	**1.30** (0.78; 2.32)	0.38 (0.22; 0.67)	321	357 (357; 357)	0.16	0.06	0.28

Figure 1a: TAC trajectories for 30% recovery and allow TAC to decrease in the first 2 years ($CPUE_{targ}$=1.22). The median and 5th and 95th percentiles are shown (the last two coincide with the medians).

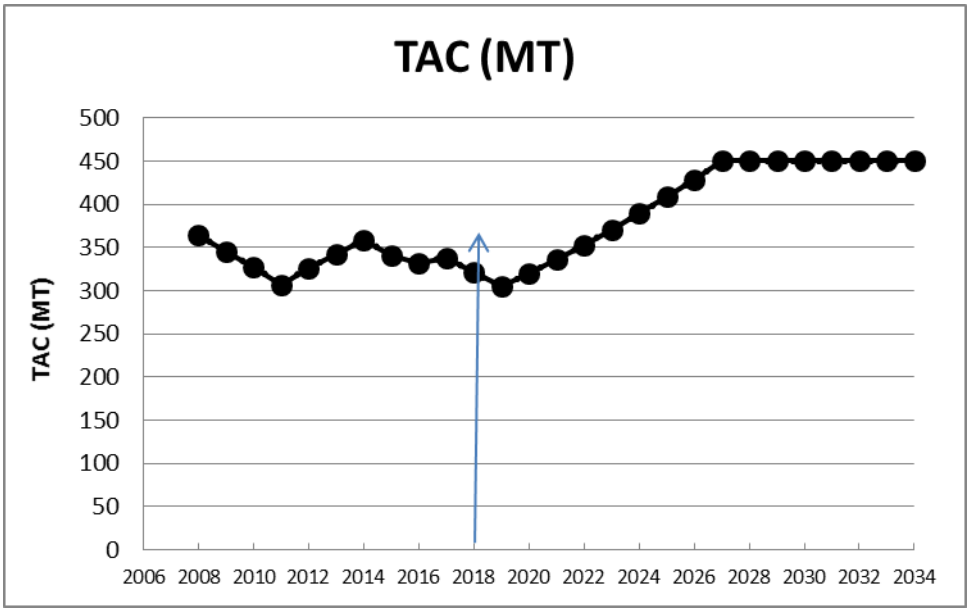


Figure 1b: TAC trajectories for 30% recovery and do NOT allow TAC to decrease in the first 2 years ($CPUE_{targ}$=1.22). The median and 5th and 95th percentiles are shown (the last two both coincide with the medians).

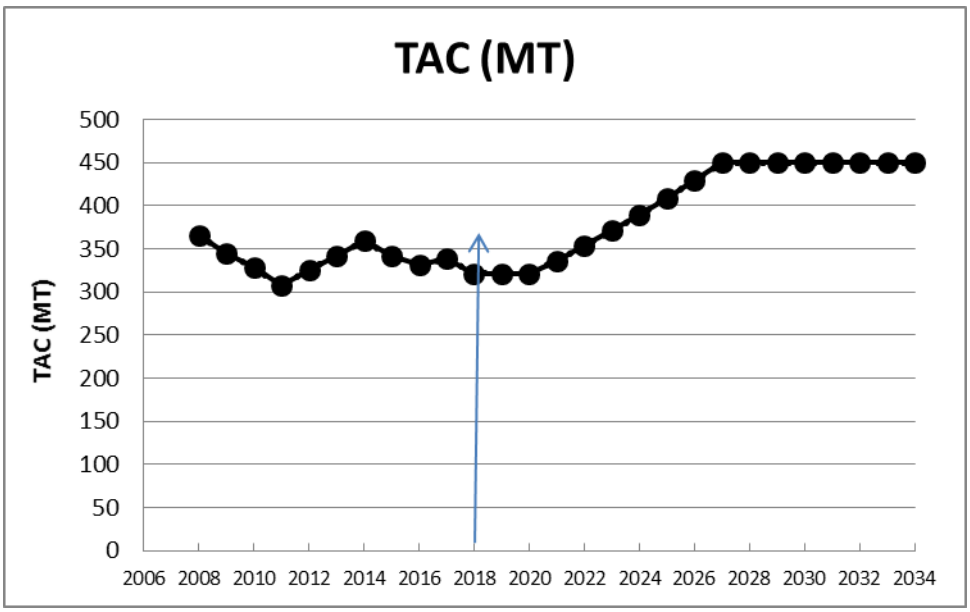


Figure 1c: TAC trajectories for 32% recovery and do NOT allow TAC to decrease in the first 2 years ($CPUE_{targ}$=0.85). The median and 5th and 95th percentiles are shown (the last two both coincide with the medians).

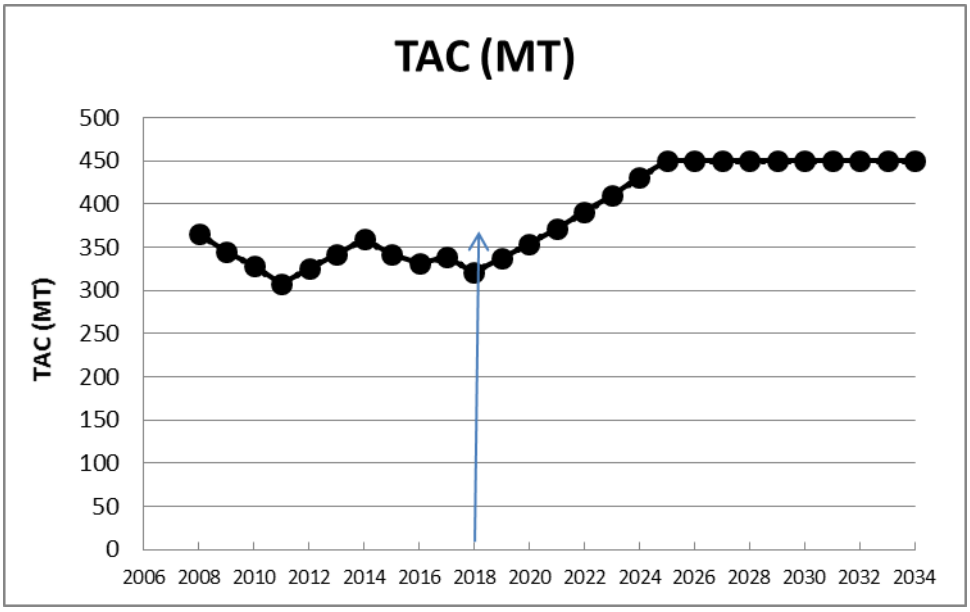


Figure 1d: Comparison of median TAC "trajectories".

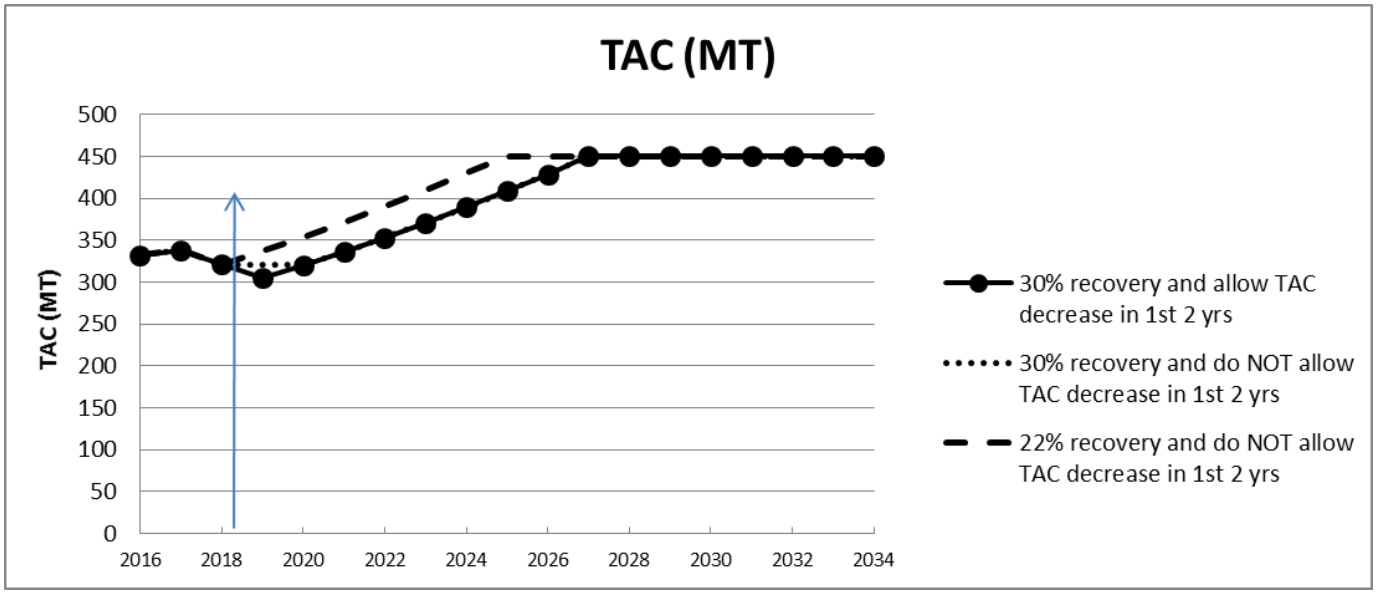


Figure 2a: The median, 5th and 95th percentiles of the Bsp/K trajectories for a CMP with 30% recovery which allows a TAC decrease in the first 2 years ($CPUE_{targ}$=1.22). The lower plot is from 2006 onwards only.

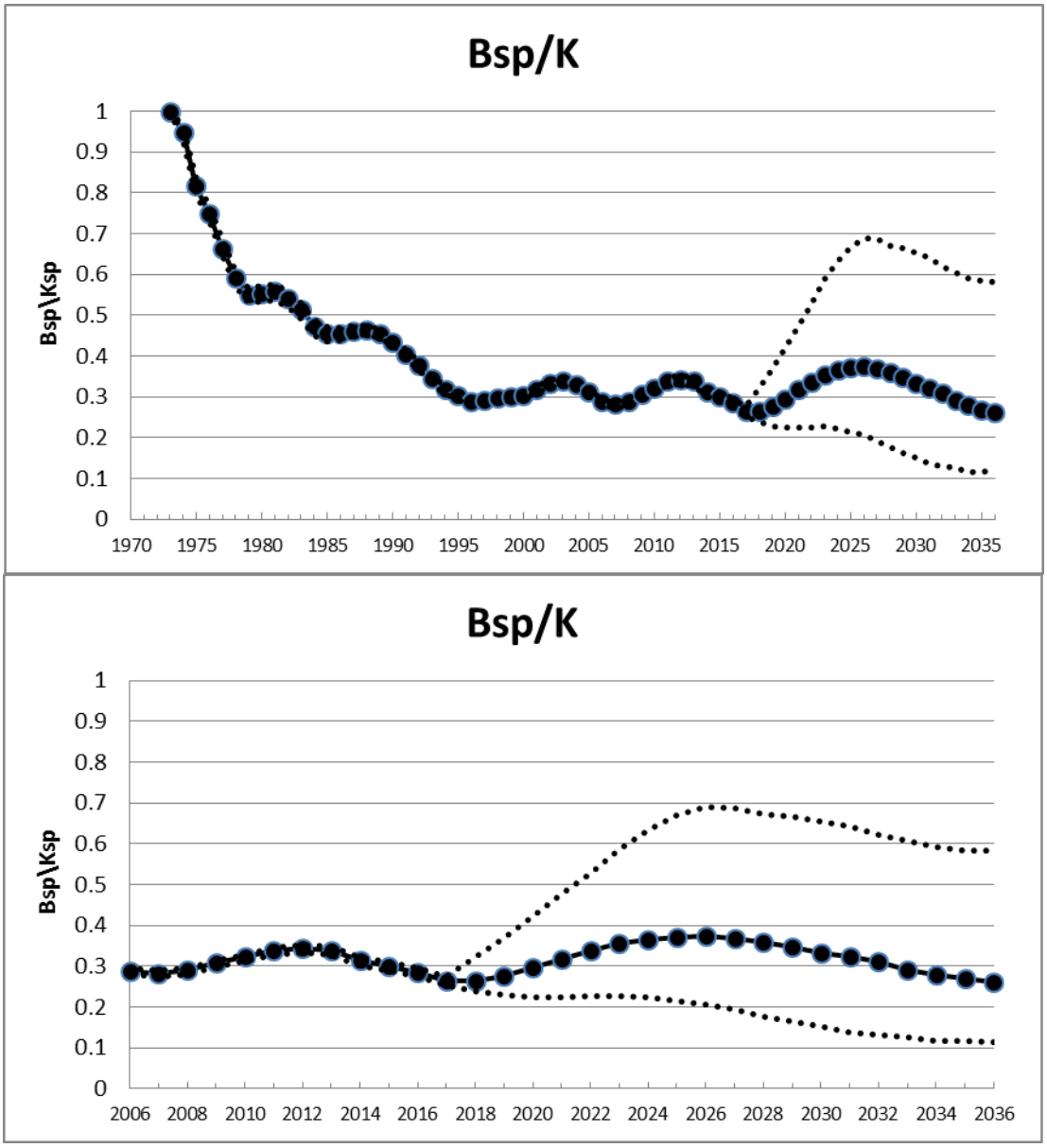


Figure 2b: The median, 5th and 95th percentiles of the Bsp/K trajectories for a CMP with 30% recovery which does NOT allow TAC decrease in the first 2 years ($CPUE_{targ}$=1.22). The lower plot is from 2006 onwards only.

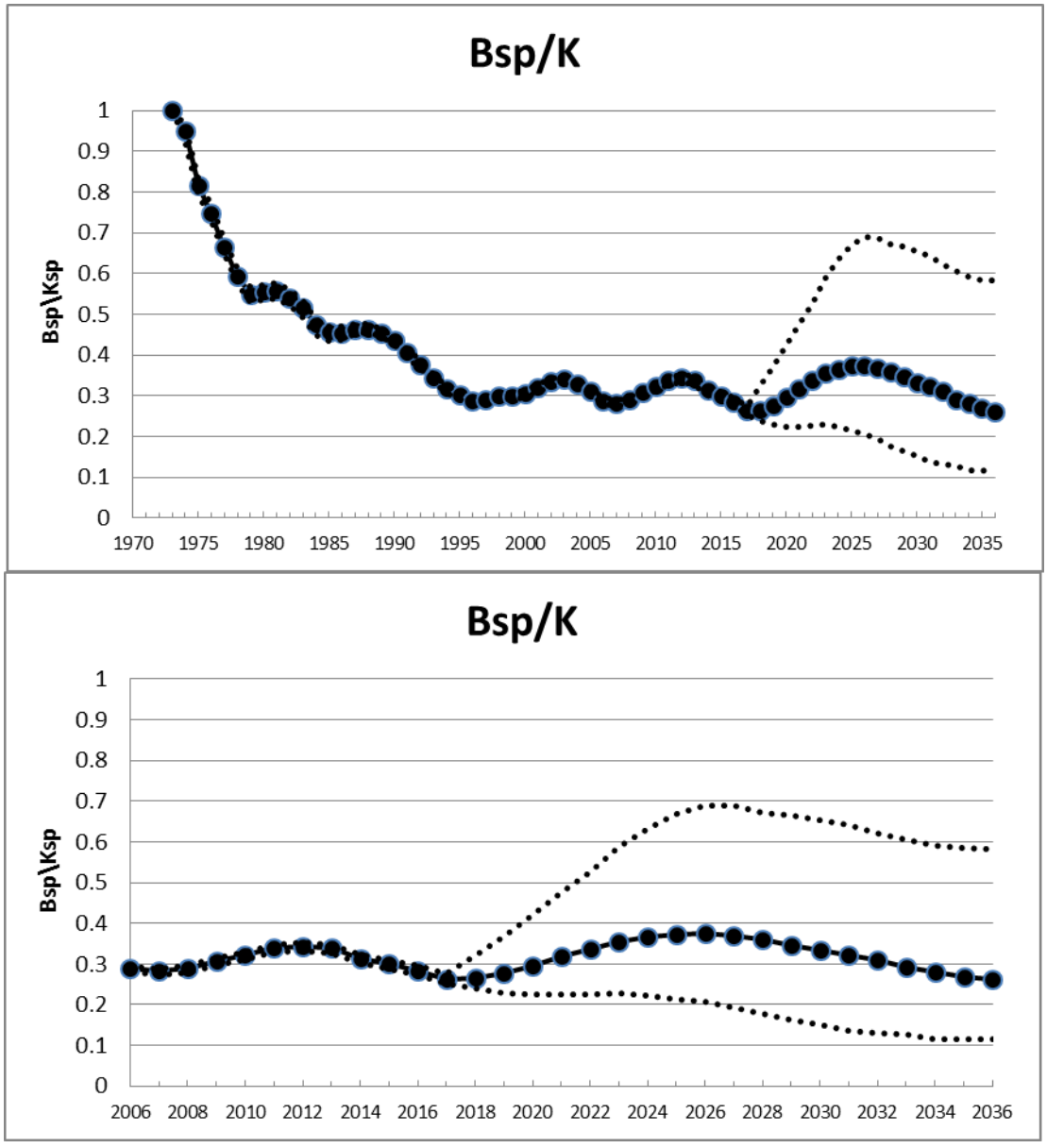


Figure 2c: The median, 5th and 95th percentiles of the Bsp/K trajectories for a CMP with 32% recovery which does NOT allow TAC decreases in the first 2 years ($CPUE_{targ}$=0.85). The lower plot is from 2006 onwards only.

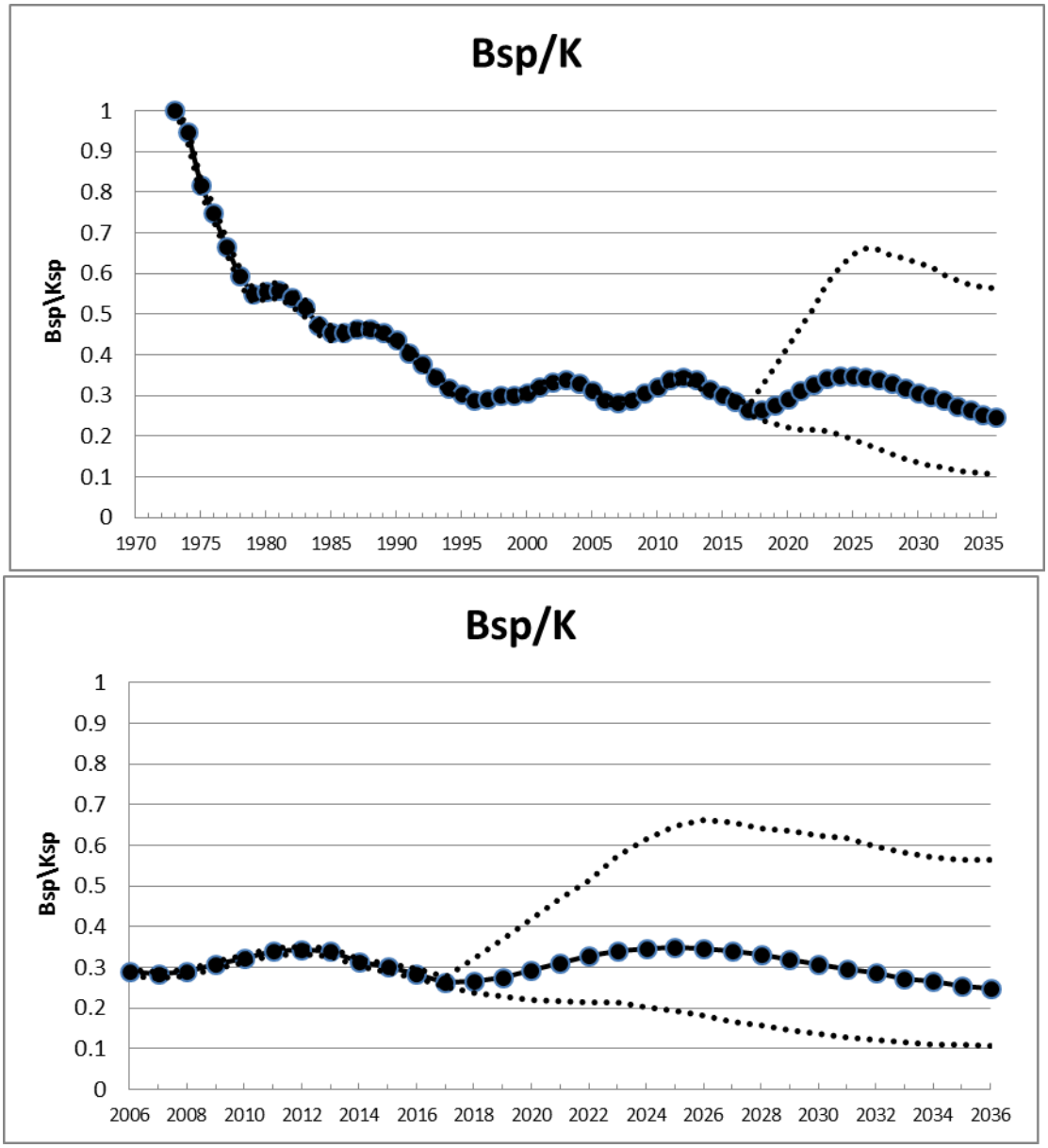


Figure 3a: The median, 5th and 95th percentiles of the Bexp/K trajectories for each area for a CMP with 30% recovery which allows TAC decreases in the first 2 years ($CPUE_{targ}$=1.22). The lower plot is from 2006 onwards only.

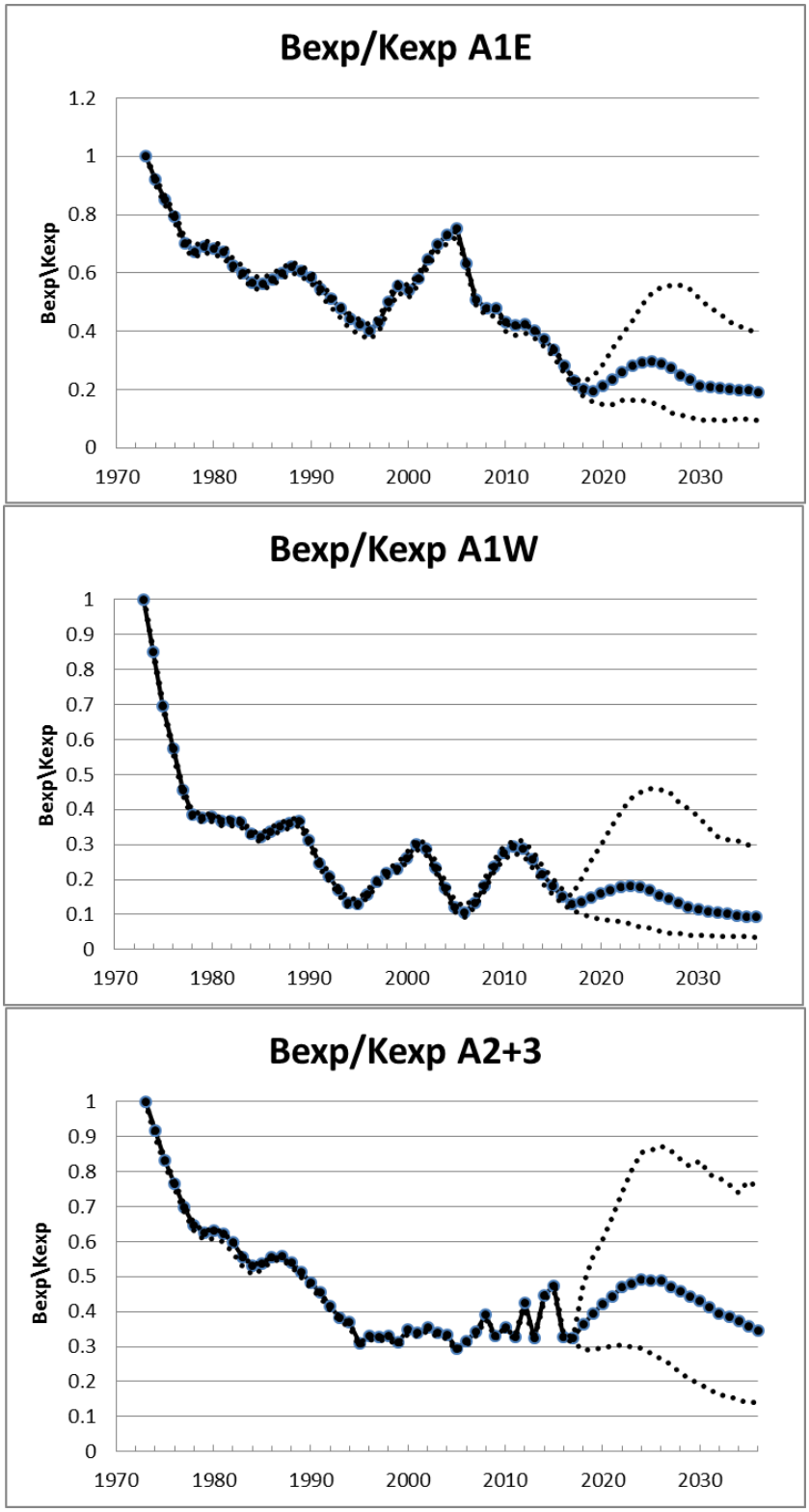
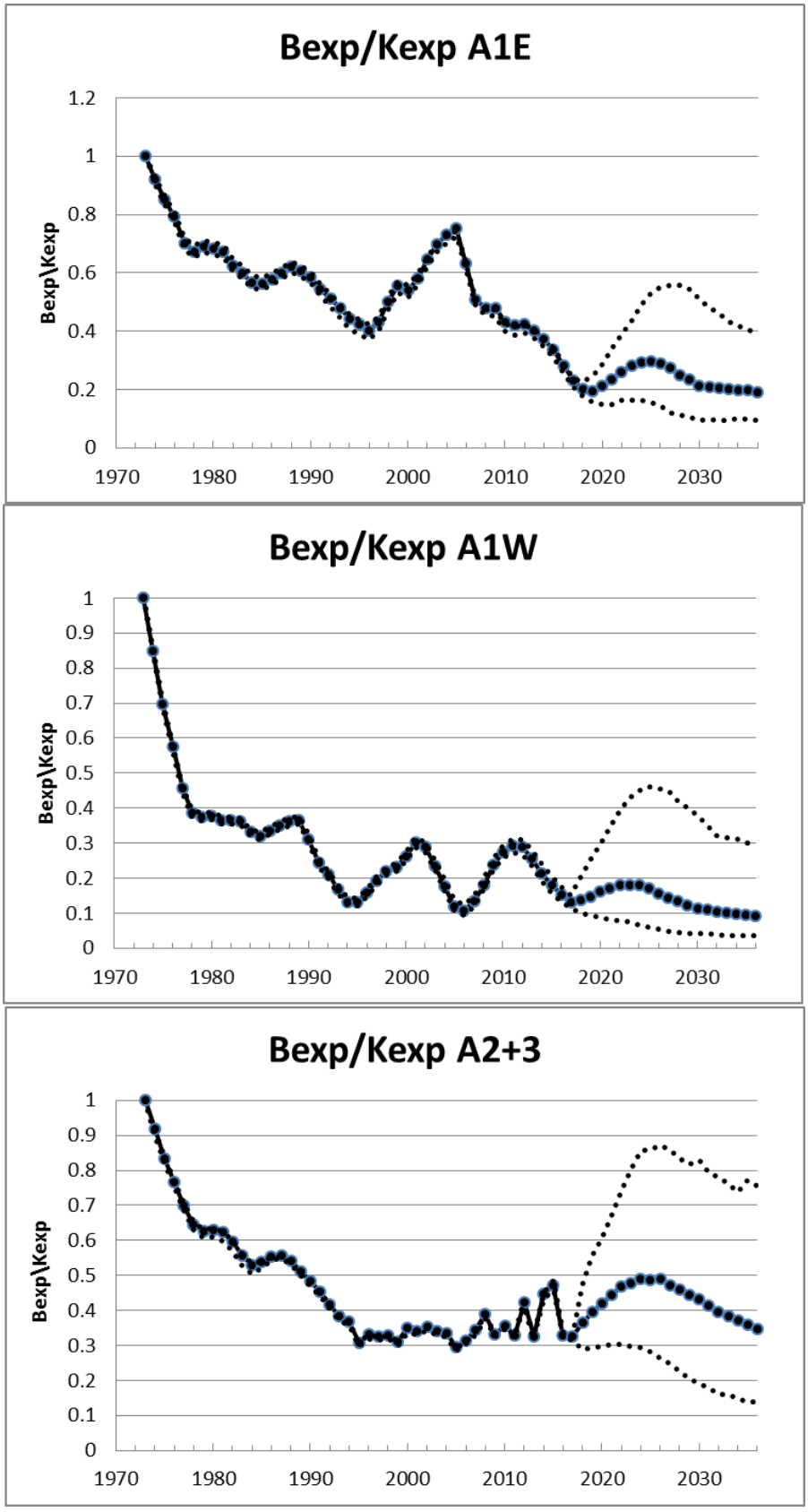


Figure 3b: The median, 5th and 95th percentiles of the Bexp/K trajectories for each area for a CMP with 30% recovery which does NOT allow TAC decreases in the first 2 years ($CPUE_{targ}$=1.22). The lower plot is from 2006 onwards only.



Appendix: CMP-2019

An OMP for recommending the TAC for South Coast rock lobster resource was first developed and implemented for 2008[1] (Johnston and Butterworth 2008). A number of further OMPs have since been developed for the management of this resource. The most recent, OMP-2014, has been used for a period of five years to set the SCRL TAC. OMP-2014 had a median target spawning biomass $B^{sp}_{2025}/B^{sp}_{2006}$ of 1.30 when simulation tested under the base case OM at that time, i.e. a spawning biomass increase in median terms of 30% over the 2006-2025 period.

CMP 2019

The TAC setting algorithm for CMP-2019

The algorithm used to recommend the TAC for the South Coast Rock Lobster fishery for season *y*+1 is:

$$TAC_{y+1} = TAC_y[1 + \alpha \frac{\overline{CPUE}_y - CPUE_{targ}}{CPUE_{targ}}] \quad (1)$$

where $\overline{CPUE}_y$ is a measure of recent CPUE and is calculated as follows:

$$\overline{\overline{CPUE}}_y = \frac{1}{3}\sum_{y'=y-3}^{y-1}\sum_{A=1}^{3}\lambda_A CPUE^A_{y'} \quad (2)$$

where

$CPUE^A_{y'}$ is the GLM standardised CPUE for area *A* in year y' and

the CPUE weighting factors, $\lambda_{A1E}, \lambda_{A1W}$ and λ_{A2+3} relate to the proportion of the overall biomass in each the three fishing areas, and were calculated using estimated values of *q* and B^{exp} for 2018 from the updated RC model to be:

$$\lambda_{A1E} = 0.006$$

$$\lambda_{A1W} = 0.006$$

$$\lambda_{A2+3} = 0.988$$

Note that TAC_y is the TAC set (not the catch taken) in season *y*.

The tuning parameter α controls how responsive the OMP is to CPUE deviations from the CPUE target, and for CMP-2019 is set to be 1.0.

Note that the TAC for season *y*+1 is to be based upon the CPUE series that ends in season *y*-1, i.e. the TAC recommendation for the 2019 season would be based on a CPUE series that ended with the most

[1] The convention used here is that 2008 refers to the 2008/2009 season.

recent CPUE value available at the time the TAC recommendation is required (August 2019) which would be the 2017 season.

Inter-annual TAC constraint

A rule to restrict the inter-annual TAC variation to no more than 5% up or down from season to season is applied as in previous OMPs, i.e.:

$$\text{if } TAC_{y+1} > 1.05TAC_y \qquad TAC_{y+1} = 1.05TAC_y \tag{3}$$

$$\text{if } TAC_{y+1} < 0.95TAC_y \qquad TAC_{y+1} = 0.95TAC_y$$

Maximum CAP on TAC

A maximum cap on TAC in any year in the future is set at 450 MT.

Reference

Johnston, S.J. and D.S. Butterworth. 2008. OMP 2008 for the South Coast Rock Lobster Resource. MCM document, MCM/2008/AUG/SWG-SCRL/30. 8pp.